Finding Correlations Between Driver Stress and Traffic Accidents: An Experimental Study

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Abstract. As the number of people getting injured or killed on the roads is constantly growing, it is crucial to identify and prevent potential factors causing traffic accidents. This paper focuses on one of such factors – namely, the drivers' stress, which is known to be one of the main causes of traffic accidents, and timely detection of such situations becomes an important challenge. The paper aims to find a potential correlation between the driver stress when riding through a specific urban location and the recorded history of traffic accidents in that specific location. If proven, such a correlation can help to prevent traffic accidents and re-design urban spaces in a safer manner. To achieve this goal, the paper combines cross-disciplinary techniques from Computer Science and Physiology to measure drivers' stress levels using physiological sensors during city rides, and match these experimental results against a map of previously recorded traffic accidents. As a result, the conducted study indicates that the correlation indeed exists, and measuring drivers' stress levels using physiological sensors is a promising approach to minimise the amount of traffic accidents.

Keywords: Stress detection · Physiological sensors · Traffic accident · Cube of emotions

1 Introduction

Traffic accidents cause considerable damage to national economies worldwide. As of 2013, the World Health Organisation (WHO) reported 1.25 million people killed in traffic accidents with another 20–50 million people sustaining non-fatal injuries as a result of road traffic collisions or crashes [1]. Factors leading to this alarming statistics are manifold, among which driver stress is seen as one of the main problems. Driver stress typically occurs as a result of curtain conditions or circumstances experienced by the driver before or during the ride. These stressful conditions represent a curtain emotional and psychological workload on the driver, which can be quantified. As suggested by [9], there are four levels of driver stress – namely, *no stress*, *low stress*, *medium stress*, and *high stress*. Arguably, the latter three need to be avoided and prevented, as they are most likely to

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